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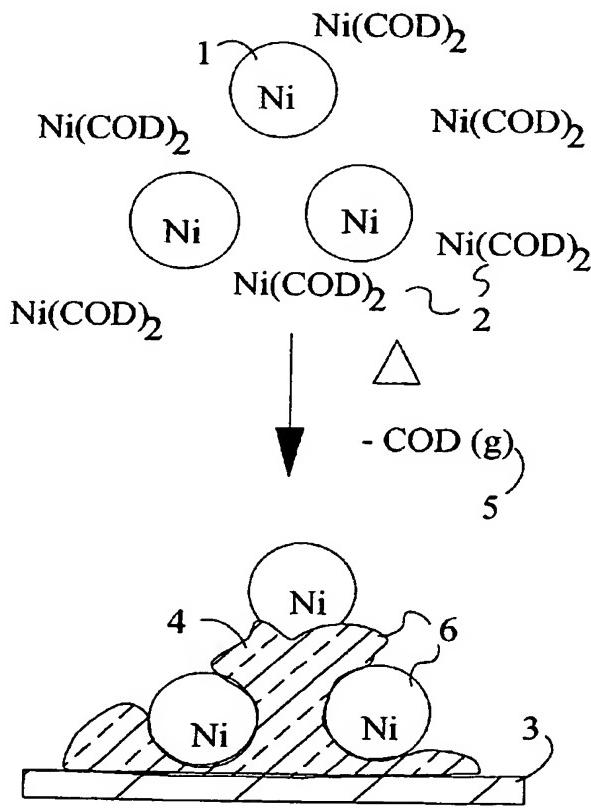
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[Continued on next page]

(54) Title: DIRECT PRINTING OF THIN-FILM CONDUCTORS USING METAL-CHELATE INKS



(57) Abstract: A process for forming an electrical conductor on a substrate is provided, consisting essentially of providing an ink comprised of a metallic chelate, printing directly thereon the ink, and decomposing the ink wherein the metal-chelate is converted to a solid metal conductor on the substrate.

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, INSPEC, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99 19900 A (PATTERNING TECHNOLOGIES LTD ; SPEAKMAN STUART (GB); THIN FILM TECHN) 22 April 1999 (1999-04-22) page 5, line 29 -page 46, line 27	1-6,10, 12,13, 15,18 7,8,16, 23,24
Y	---	7,8,16, 23,24
Y	US 4 599 277 A (BROWNLOW JAMES M ET AL) 8 July 1986 (1986-07-08) column 5, line 40 -column 8, line 13	7,8,16, 23,24
A	US 5 882 722 A (KYDD PAUL H) 16 March 1999 (1999-03-16) cited in the application column 6, line 31 -column 11, line 8 --- -/-	1-3,7, 10-12, 14,15, 18,19, 22,23

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	TENG K F ET AL: "INK JET ASSISTED METALLIZATION FOR LOW COST FLAT PLATE SOLAR CELLS" PHOTOVOLTAIC SPECIALISTS CONFERENCE. NEW ORLEANS, MAY 4 - 8, 1987, NEW YORK, IEEE, US, vol. CONF. 19, 4 May 1987 (1987-05-04), pages 1430-1434, XP000078989 the whole document ---	1,2,7, 11,12, 15,20, 22,23
A	TENG K F ET AL: "APPLICATION OF INK JET TECHNOLOGY ON PHOTOVOLTAIC METALLIZATION" IEEE ELECTRON DEVICE LETTERS, IEEE INC. NEW YORK, US, vol. 9, no. 11, 1 November 1988 (1988-11-01), pages 591-593, XP000066587 ISSN: 0741-3106 cited in the application the whole document ---	1,2,7, 11,12, 15,20, 22,23
A	HYBERTSON B M ET AL: "DEPOSITION OF PALLADIUM FILMS BY A NOVEL SUPERCRITICAL FLUID TRANSPORT-CHEMICAL DEPOSITION PROCESS" MATERIALS RESEARCH BULLETIN, ELSEVIER SCIENCE PUBLISHING, NEW YORK, US, vol. 26, no. 11, 1 November 1991 (1991-11-01), pages 1127-1133, XP000235263 ISSN: 0025-5408 the whole document ---	1,8,12, 15,16, 23,24

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 01/00430

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
WO 9919900	A	22-04-1999	GB	2330451 A	21-04-1999
			GB	2330331 A	21-04-1999
			AU	9451098 A	03-05-1999
			CA	2306384 A1	22-04-1999
			EP	1027723 A2	16-08-2000
			WO	9919900 A2	22-04-1999
			GB	2369087 A	22-05-2002
US 4599277	A	08-07-1986	DE	3581158 D1	07-02-1991
			EP	0177772 A2	16-04-1986
			JP	1012672 B	01-03-1989
			JP	1526137 C	30-10-1989
			JP	61089839 A	08-05-1986
US 5882722	A	16-03-1999	US	6036889 A	14-03-2000

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